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On: March 1, 2004
By: Richard D. Fuerle

Signature: [signature]
Date: March 1, 2004

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: QI WANG

Examiner: Egwim, Kelechi Chidi

Serial No.: 09/761,625

Group Art Unit: 1713

Filed: January 17, 2001

For: STABILIZATION OF POLYMERS
AFTER EXPOSURE TO OXIDATION

The Commissioner of Patents
and Trademarks
Washington, D. C. 20231

LETTER

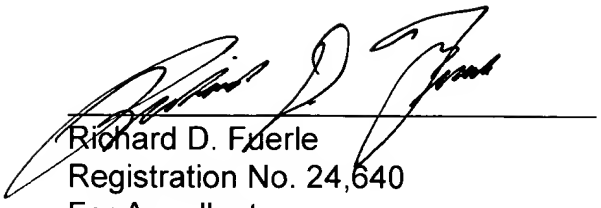
Sir:

Attached hereto are three copies of Appellant's Brief.

Please charge the filing fee of Three Hundred Thirty Dollars ($330.00) to Deposit Account No. 15-0163. Please charge any deficit or credit any overpayment to Deposit Account No. 15-0163.

No oral hearing is requested.

Respectfully,



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March 1, 2004
CASE 6956Cont.
RDF/rdf

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Applicant: Qi Wang

Examiner: Egwim, Kelechi Chidi

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BRIEF OF APPELLANT

Sir:

This is an appeal from the Final Rejection of the Examiner dated December 17, 2003, rejecting Claims 25 to 27, 29 to 46.

(1) Real Party In Interest

The real party in interest is the assignee, Occidental Chemical Corporation.

(2) Related Appeals and Interferences

There are no related appeals or interferences.

(3) Status of Claims

Claims 1 to 24 were filed with the application.

Claims 1 to 24 were canceled and Claims 25 to 48 were added.

Claims 28, 47, and 48 were allowed.

Claims 29, 30, 35, 37, 40, 41, and 43 were withdrawn from consideration, but will be considered upon the allowance of a generic claim.

Claims 25 to 27, 31 to 34, 36, 38, 39, 42, and 44 to 46 were finally rejected by the Examiner and are appealed.

(4) Status of Amendments

An amendment was filed after the Final Rejection in the CPA application, but was not entered.

(5) Summary of the Invention

Appellant's invention is directed at a polymer of polyvinyl chloride, polycarbonate, polyurethane, polyethylene, or polypropylene that contains about 0.005 to about 10 phr of a stabilizer. The stabilizer is described by a number of chemical formulas (Claim 25).

(6) Issue

Are Claims 25 to 27, 31 to 34, 36, 38, 39, 42, and 44 to 46 enabled by the specification as required by U.S.C. §112, first paragraph?

(7) Grouping of Claims

Claims 29 to 35 and 37 to 44 do not stand or fall with the remaining

claims because these claims are directed to stabilizers that are more narrowly defined and more enabled by the specification.

(8) Argument

I. Claims 25 to 27, 31 to 34, 36, 38, 39, 42, and 44 to 46 were rejected under 35 U.S.C. §112, first paragraph. It is the Examiner's position that, "There is nothing of record to indicate that the person of ordinary skill in the art would be enabled by the original specification to **make and use all** the claimed stabilizer compounds, commensurate in scope with these claims. In re Vaeck, 947 F. 2d 488, 495, 20 USPQ2d 1438, 1444 (Fed. Cir. 1991; In re Fisher, 427 F. 2d 833, 839, 166 USPQ 18, 24 (CCPA 1970)." In In re Vaeck, the court said, "enablement requires that the specification teach those in the art to make and use the invention without 'undue experimentation.' ... That *some* experimentation may be required is not fatal; the issue is whether the amount of experimentation required is 'undue.'" (page 1444)

The invention in Vaeck involved using genetic engineering techniques to insert DNA from *Bacillus* into 150 genera of cyanobacteria. The appellant had only a single species of cyanobacteria in a working example and mentioned only 9 of the 150 genera. Given the uncertainties of genetic engineering, it was not unreasonable for the court to require more support. However, Appellant's invention is in organic chemistry, where reactions have been known, used, and studied extensively for many years. It is well known, for example that hydrogens on a ring can be replaced by alkyl and related groups and that the reaction will almost always proceed. Appellant's claims are not

even directed at the stabilizers themselves. Rather, Appellant is claiming a composition of a polymer with a stabilizer. Many of the stabilizers are commercial products. Procedures for making other stabilizers used by Appellants are described in the literature. Stabilizers used by Appellants that are not commercial products and are not described in the literature are analogous to those that are and an organic chemist would have not problem making them. Since Appellant is not claiming the stabilizers per se and many of the stabilizers used in Appellant's composition are commercial or described in the literature, the only issue is whether those stabilizers that are not commercial and are not described in the literature could be made by an organic chemist without undue experimentation.

In addition, the Examiner has allowed Claim 47, which is directed to a composition of a polymer and a stabilizer. Thus, the Examiner concedes that stabilizers that are within the scope of Claim 47 meet the requirements of 35 U.S.C. §112. Therefore, it is only those stabilizers that are not within the scope of Claim 47, are not commercial products, and are not described in the literature that could possibly fall outside the purview of 35 U.S.C. §112.

Appellant filed a Declaration under 37 CFR 132. In that Declaration Appellant, Dr. Qi Wang, stated, "The stabilizers within the scope of the claims of the above-identified patent application are all either commercially available or can be prepared by straightforward techniques that would be obvious to any person having a doctorate in organic chemistry. None of the stabilizers within the scope of the claims of the above-identified patent application are difficult to synthesize and no undue experimentation

would be required to synthesize them."

Dr. Wang then went on to describe the availability of specific stabilizers, "Some of the 4,7-dihydro-1,3-dioxepins, such as 4,7-dihydro-2-phenyl-1,3-dioxepin and their benzo analogs, such as 1,5-dihydro-3-methoxy-2,4-benzodioxepin, some of the 2-butene-1,4-diol derivatives, such as cis-4-benzyloxy-2-buten-1-ol, and the parent phthalan, as well as its non-aromatic ring-containing analogs, such as 2,5-dimethoxy-2,5-dihydrofuran, are commercially available from the Sigma-Aldrich Company. Stabilizers in these categories that are not commercially available can be prepared by condensing an allylic diol or an aromatic analog of an allylic diol with an aldehyde, ketone, acid, acid halide, ester, alkyl halide, or alcohol, or by other reactions known to those skilled in the art. See, for example, 'A Stereospecific Route to Aziridinomitosanes: The Synthesis of Novel Mitomycin Congeners,' by Samuel Danishefshy et al. *J. Am. Chem. Soc.* **1985**, *107*, 3891-3898. Some of the open chain aromatic ring and triple bond-containing stabilizers, such as 1,4-benzenedimethanol, 2-butyne-1,4-diol and 2,6-pyridinedimethanol, are available from the Sigma-Aldrich Company. The stabilizers in this category that are not commercially available, can be prepared by alkylation of commercially available diols via the Williamson reaction or by alkylation of commercially available aromatic compounds via a Friedel-Craft reaction. (See *Advanced Organic Chemistry*, by Jerry March, 4th ed., page 342 and pages 479-484.) Stabilizers containing heteroatoms, such as Sn, Si, P, and B, can be prepared by reacting the corresponding alcohols with a mono- or di tin, silicon, phosphorus, or boron halide. For example, the silicon derivatives can be made by the method

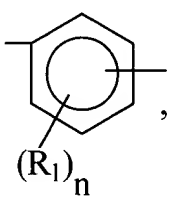
described in *Silicon Reagents for Organic Synthesis* by W. P. Weber. Stabilizers where Y is a sulfur atom, such as 1,4-, 1,2-, and 1,3-benzenedimethanethiols, are commercially available from the Sigma-Aldrich Company. Commercially unavailable stabilizers in this category can be prepared from alcohol, aldehyde, and aromatic ring-containing compounds by methods such as those described by G. A. Olah, Qi Wang, et al. ('Superelectophilic Methylthiomethylation of Aromatics with CH_3SCH_2Cl:3$AlCl_3$.' *Synthesis*, **1994**, 276.; 'Boron Trifluoride Monohydrate Catalyzed One Flask 2,2,2-Trifluoro-1-(ethylthio)ethylation of Aromatics with Trifluoroacetaldehyde Hydrate and Ethanethiol.' *Synlett*, **1993**, 32.)"

The commercially available compounds are, of course, those that are more basic and more commercially valuable. As more groups are added to the basic compounds, yields fall and the compounds may be less valuable, so they are not offered commercially. But they can still be made by the same methods.

The following is a comparison of the differences between rejected independent Claim 25, the broadest claim, and allowed Claim 47:

(1) Claim 25 requires about 0.005 to about 10 phr of a stabilizer while Claim 47 requires about 0.2 to about 6 phr of a stabilizer. However, the Examiner has not argued that the greater range of Claim 25 is non-enabling.

(2) In the first formula in both Claim 25 and Claim 47, a -CH=CH- group is required in Claim 47, but in Claim 25 that group ("X") can be $-R_1C{=}CR_1-$, $-C{\equiv}C-$,

or 

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so only the latter two groups are in Claim 25, but not in Claim 47. Appellant's Example 10 provides a working example of the -C≡C- group and Appellant's working Example 11 provides a working example of a benzene ring group.

Also, the first formula in Claim 25 uses R_1 and R_2 groups, where Claim 47 uses hydrogens. The definitions of R_1 and R_2, however, are for common organic substituents that are normally permitted in chemical applications. The definition of "q" is also broader in Claim 25, but "q" affects only polymer length, which can be controlled by known techniques. (The definition of "q" is broader in all the claims except Claims 34 to 36 and 44 to 46.)

(3) The second formulas in both Claim 25 and Claim 47 are identical, except a -CH=CH- group is required in Claim 47, but in Claim 25 that group is "X," which was discussed hereinabove. Also, R_1 is used in Claim 25 for two of the hydrogens that are in the Claim 47 formula and "q" is broader. Again, these differences are within the normal range permitted in chemical applications.

(4) The next formula in Claim 47 (second row on the left) is absent in Claim 25, so in this respect Claim 47 may actually be broader than Claim 25.

(5) The next formula (second row on left in Claim 25 and second row in the middle in Claim 47) is identical in both claims, except for the "X" group and the two R_1 groups in Claim 25. The "X" group, where "X" is a benzene ring, is illustrated by Appellant's working Example 8.

(6) In the last formula in Claim 25 (second row on the right) an "X" group is used

while a benzene ring is used in Claim 47. Thus, the formulas in Claim 47 either use a double bond or a benzene ring, while the formulas in Claim 25 use "X," which includes both a double bond and a benzene ring. The fact that the Examiner concedes that a benzene ring is enabled in the last formula in Claim 47 and a double bond is enabled in the other formulas in Claim 47 suggests that it would not require undue experimentation for a person skilled in the art to use either a double bond or a benzene ring in any of the formulas in Claim 25.

(7) As was noted hereinabove, R_1 and R_2 groups are used in Claim 25 for some of the hydrogens in Claim 47, but that is normal practice in chemical applications and Appellant's R_1 and R_2 groups are not unusually broad.

Claim 29 does not stand or fall with the remaining claims in this rejection because it is specifically directed to the stabilizer cis-1,4-dibenzyloxy-2-butene. Appellant's Example 4 provides a working example of this stabilizer, so Claim 29 is certainly enabled by Appellant's specification, especially since Claim 28, which is very similar, was allowed.

Claim 30 does not stand or fall with the remaining claims in this rejection because it is specifically directed to a phthalan stabilizer. Appellant's Example 2 provides a working example of this stabilizer, so Claim 30 is certainly enabled by Appellant's specification.

Claims 31 and 32 do not stand or fall with the remaining claims in this rejection because those claims are specifically directed to stabilizers where the "X" group is a double bond. Appellant's Examples 3 and 4 provide working examples of stabilizers

where "X" is a double bond, so Claims 31 and 32 are enabled by Appellant's specification. Moreover, the Examiner allowed Claim 47, where "X" is a double bond, so the only difference between Claims 31 and 32 and Claim 47 is in the scope of the R_1 and R_2 groups.

Claim 33 does not stand or fall with the remaining claims in this rejection because it is specifically directed to a more limited definition of the R group. The R group defines a range normally permitted in chemical applications.

Claim 34 does not stand or fall with the remaining claims in this rejection because it is specifically directed to only the first two formulas in Claim 25. Appellant's Examples 3 and 4 illustrate the first formula and Appellant's Examples 6, 7, and 8 illustrate the second formula.

Claim 35 does not stand or fall with the remaining claims in this rejection because it is specifically directed to only the second formula in Claim 25, where "X" is a double bond as in allowed Claim 47. Claim 35 is therefore virtually identical to the second formula in allowed Claim 47, being broader only in the amount of stabilizer that can be used.

Claim 37 does not stand or fall with the remaining claims in this rejection because it is specifically directed to stabilizers where R (i.e., R_1 or R_2 in the formulas) is benzyl. Appellant's Examples 3 and 4 illustrate stabilizers with a benzyl group.

Claims 38 does not stand or fall with the remaining claims in this rejection because Claim 38 is specifically directed to stabilizers where R_1 is hydrogen. When R_1 is hydrogen Claim 38 is similar to allowed Claim 47, differing primarily in the definition

of "X" and the R_2 group in the first formula.

Claim 39, 40, and 41 do not stand or fall with the remaining claims in this rejection because these claims are directed to narrower definitions of R_2, R_3, and R_1, respectively, and therefore these claims are more enabled by Appellant's specification than is Claim 25.

Claim 42 does not stand or fall with the remaining claims in this rejection because it is specifically directed to six stabilizer formulas where the "X" group is either a double bond, a triple bond, or a benzene ring. All of the formulas in Claim 42 fall within the scope of the first formula in Claim 25. In the first two formulas in Claim 42 the "X" group is a double bond. These formulas are illustrated by Appellant's Examples 3 and 4. In the third formula in Claim 42 (first formula in the second row) the "X" group is a triple bond. That formula is illustrated by Appellant's Example 10. In the last three formulas in Claim 42 the "X" group is a benzene ring. Those formulas are illustrated by Appellant's Example 11. Thus, Appellant has a working example that illustrates each of these formulas.

Claim 43 does not stand or fall with the remaining claims in this rejection because it is specifically directed to two stabilizer formulas where the "X" group is either a double bond or a benzene ring. These two formulas fall within the scope of the third formula in Claim 25 (the first formula in the second row). The stabilizer of the first formula in Claim 43 is illustrated by Appellant's Examples 6 and 7. The stabilizer of the second formula in Claim 43 is illustrated by Appellant's Example 8.

Claim 44 does not stand or fall with the remaining claims in this rejection

because it is specifically directed to two stabilizer formulas where the "X" group is a double bond. These two formulas correspond to the first and second formulas in Claim 25. The stabilizer of the first formula in Claim 44 is illustrated by Appellant's Examples 3 and 4. The stabilizer of the second formula in Claim 44 is illustrated by Appellant's Examples 6 and 7. The formulas in Claim 44 are the same as two of the formulas in allowed Claim 47, except that R_1 and R_2 are used instead of hydrogen.

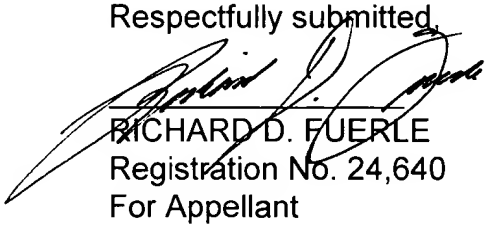
To summarize, Appellant's rejected claims differ in scope from allowed Claim 47 in that the definitions of some of the groups are broader. However, Appellant has provided eleven working examples, nine of which illustrate the formulas in his broadest rejected Claim 25. Of those working examples, 10 of the stabilizers were purchased and one was make following the procedure given in a U.S. patent (page 11, lines 7 to 9, of Appellant's specification). Appellant has, in his specification, described procedures for preparing the stabilizers and has cited procedures in the literature for the preparation the stabilizers (page 7, lines 2 to 8; page 9, lines 4 to 7; and page 12, lines 24 and 25). Appellant also filed a Declaration under 35 U.S.C. 132 describing the preparation of the stabilizers and citing literature references for their preparation. The range of compounds claimed is not believed to be unreasonably large in view of current practice in chemical patent applications.

Finally, Appellant is not claiming the stabilizers as new compounds. Appellant is claiming a composition in which stabilizers are a component. Appellant believes that he has provided more enablement than is normally required for components of compositions in chemical applications, especially when many of the stabilizers are

known and commercially available.

For these reasons, it is submitted that Appellant's claims comply with the requirements of 35 U.S.C. 112, first paragraph. The Board is therefore requested to reverse the Examiner and allow Claims 25 to 27, 31 to 34, 36, 38, 39, 42, and 44 to 46.

Respectfully submitted,



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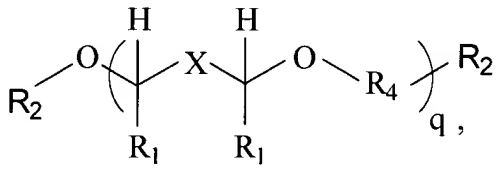
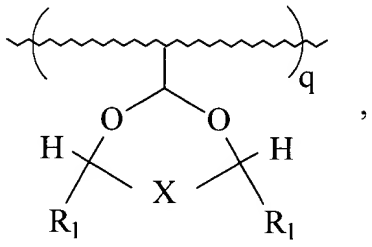
CASE 6956Cont.
March 1, 2004

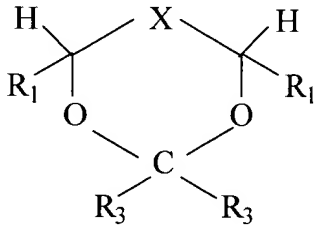
(9) Appendix

Claims 1 to 24 (Canceled)

25. A polymer which comprises polyvinyl chloride, polycarbonate, polyurethane, polyethylene, or polypropylene, containing about 0.005 to about 10 phr of a stabilizer having the formula:







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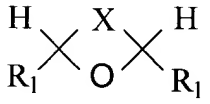
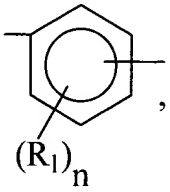


where X is $-R_1C=CR_1-$, $-C\equiv C-$,

or



each R is independently selected from hydrogen and R', each R' is independently selected from alkyl from C_1 to C_{20}, aryl from C_6 to C_{20}, alkaryl from C_7 to C_{20}, and aralkyl from C_7 to C_{20}; each R_1 is independently selected from R, OR, RCO, ROCO, $ROCO_2$, $N(R)_2$, $(R)_2NCO$, $(R)_2NCO_2$, SR, and halogen; each R_2 is independently selected from R, RCO, and ROCO, and two R_1 groups, two R_2 groups, or an R_1 group and an R_2 group can be bridged together to form a ring, except that when X is $-R_1C=CR_1-$ at least one R_2 is not hydrogen; each R_3 is independently selected from R', RCO, ROCO,

$ROCO_2$, OR, SR, and $N(R)_2$; R_4 is alkylene from C_1 to C_{20}, arylene from C_6 to C_{20}, (aryl)alkylene from C_7 to C_{20}, (alkyl)arylene from C_7 to C_{20}, alkanediyl from C_1 to C_{20}, (aryl)alkanediyl from C_7 to C_{20}, -CO-(alkylene)-CO- from C_1 to C_{20}, -CO-arylene-CO- from C_6 to C_{20}, -CO-(aryl)alkylene-CO- from C_7 to C_{20}, and -CO-(alkyl)arylene-CO)- from C_7 to C_{20}; and q is 1 to 1000.

26. A polymer according to Claim 25 wherein said polymer is polyvinyl chloride.

27. A polymer according to Claim 25 that is has been made into an article that has been sterilized with gamma radiation.

28. A polymer which comprises polyvinyl chloride, polycarbonate, polyurethane, polyethylene, or polypropylene, containing about 0.005 to about 10 phr of cis-4-benzyloxy-2-buten-1-ol.

29. A polymer according to Claim 25 wherein said stabilizer is cis-1,4-dibenzyloxy-2-butene.

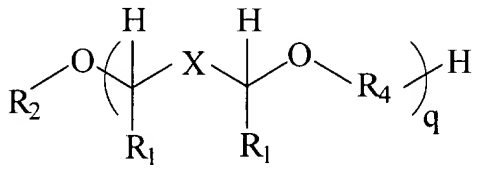
30. A polymer according to Claim 25 wherein said stabilizer is a phthalan.

31. A polymer according to Claim 25 wherein X is $-R_1C=CR_1$.

32. A polymer according to Claim 31 wherein X is -HC=CH-.

33. A polymer according to Claim 25 where each R is independently selected from hydrogen, alkyl from C_1 to C_{12}, aryl from C_6 to C_{12}, alkaryl from C_7 to C_{12}, and aralkyl from C_7 to C_{12}.

34. A polymer according to Claim 25 wherein said stabilizer has the structure:



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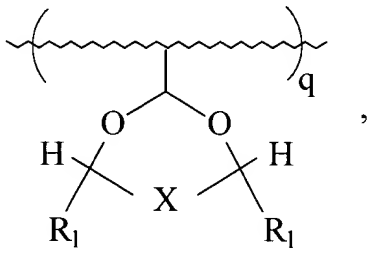
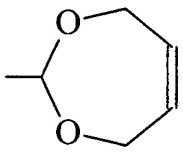


where R_4 is alkylene from C_1 to C_8, (aryl)alkylene from C_7 to C_8, or -CO-(aryl)alkylene-CO- from C_7 to C_8; and q is 1 to 5.

35. A polymer according to Claim 34 wherein said stabilizer has the pendant group



36. A polymer according to Claim 34 that has been made into an article and sterilized with gamma radiation.

37. A polymer according to Claim 25 wherein R is benzyl.

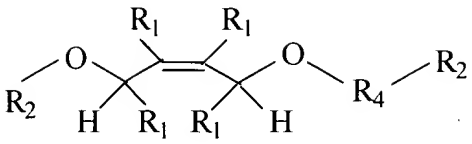
38. A polymer according to Claim 25 wherein R_1 is H.

39. A polymer according to Claim 25 wherein R_2 is R.

40. A polymer according to Claim 25 wherein R_3 is R.

41. A polymer according to Claim 25 wherein said two R_1 groups that can be bridged together to form a ring are selected from the group consisting of alkylene from C_1 to C_8, (aryl)alkylene from C_7 to C_8, and -CO-(aryl)alkylene-CO- from C_7 to C_8.

42. A polymer according to Claim 25 wherein said stabilizer has the formula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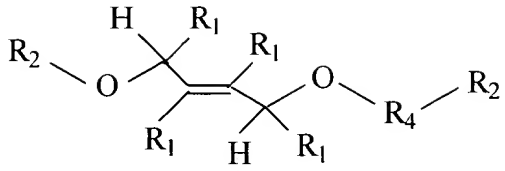
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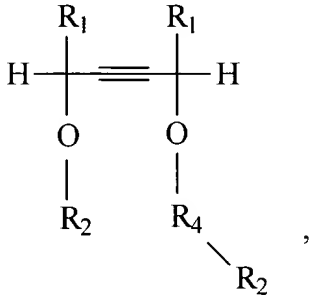
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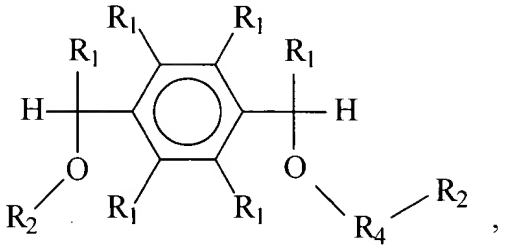
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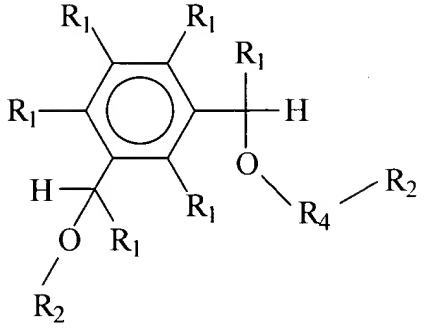
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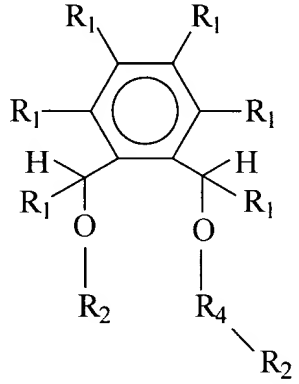
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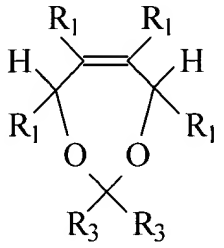
43. A polymer according to Claim 25 wherein said stabilizer has the formula:



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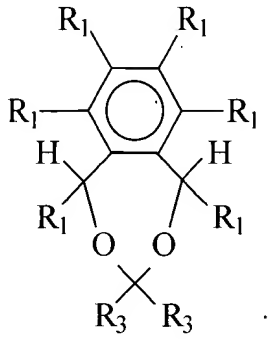
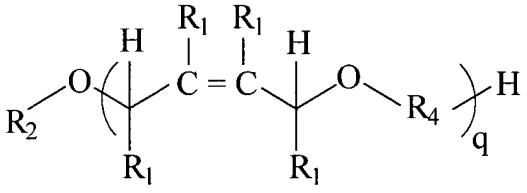
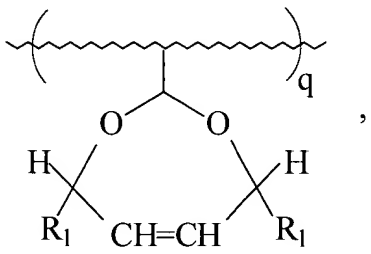


44. A polymer which comprises polyvinyl chloride, polycarbonate, polyurethane, polyethylene, or polypropylene, containing about 0.005 to about 10 phr of a stabilizer having the formula:



or



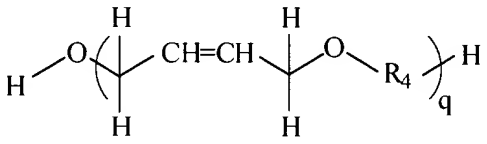
where each R is independently selected from hydrogen and R', each R' is independently selected from alkyl from C_1 to C_{20}, aryl from C_6 to C_{20}, alkaryl from C_7 to C_{20}, and aralkyl from C_7 to C_{20}; each R_1 is independently selected from R, OR, RCO, ROCO, $ROCO_2$, $N(R)_2$, $(R)_2NCO$, $(R)_2NCO_2$, SR, and halogen; each R_2 is independently selected from R, RCO, and ROCO, and two R_1 groups, two R_2 groups, or

an R_1 group and an R_2 group can be bridged together to form a ring, except that when X is $-R_1C=CR_1-$ at least one R_2 is not hydrogen; R_4 is alkylene from C_1 to C_8, (aryl)alkylene from C_7 to C_8, or -CO-(aryl)alkylene-CO- from C_7 to C_8; and q is 1 to 5.

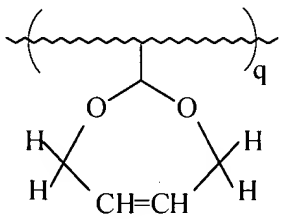
45. A polymer according to Claim 44 wherein said polymer is polyvinyl chloride.

46. A polymer according to Claim 45 that has been made into an article and said article has been sterilized with gamma radiation.

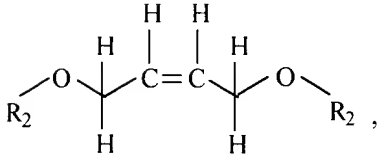
47. Polyvinyl chloride, polyurethane, polyethylene, polypropylene, or polycarbonate containing about 0.2 to about 6 phr of a stabilizer having the formula:



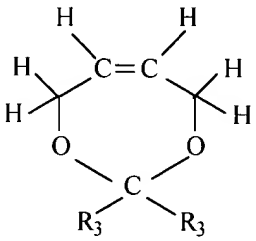
,



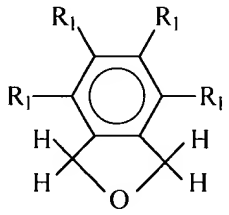
,



,



, or



where R_1 is hydrogen; one R_2 is R and the other R_2 is R or hydrogen; R_3 is R; R_4 is alkylene from C_1 to C_8, (aryl)alkylene from C_7 to C_8, or -CO-(aryl)alkylene-CO- from C_7 to C_8; R is benzyl; and q is 1 to 5.

48. Polyvinyl chloride according to Claim 47 that has been made into an article and said article has been sterilized with gamma radiation.